

SCIENCE.

FRIDAY, NOVEMBER 20, 1885.

COMMENT AND CRITICISM.

THERE WAS A REPORT last summer in the foreign journals that the Portuguese government had bought twelve hundred slaves of the king of Dahomey. It was expected that this report would be met by a prompt denial. The Portuguese journals admit the purchase, but state that these slaves were prisoners of war taken by the sovereign of Dahomey, and were about to be put to death on the occasion of a grand *fête* prepared by the king; that, when the Portuguese heard of this projected hecatomb, they sent a ship with agents to Dahomey, as a philanthropic act, and for the benefit of the blacks; that by appealing to the cupidity of the king, they purchased them, not as slaves, but as free men, to work under a contract, for a period of three years, in the cultivation of the coffee plantations on the Island of St. Thomas, after which they will receive regular wages. The continental journals reply that this is only another name for slavery, and will be the most effectual means of perpetuating the traffic in Africa; that if there are no buyers, there will be no slaves; that the African regards the slave as much an article of commerce as ivory, india-rubber, or palm-oil, but prefers the slave as acquired with greater ease; that the king of Dahomey will at once send his warriors into the interior of Africa, to capture more slaves in the place of those that are sold, and if Portugal will buy these, a perpetual traffic in slaves will be established; that this will put an end to all hope of the civilization of Africa, as it must lead to a constant state of war, the trade in slaves paying better than any other.

THE COMING MEETING of the American public health association in Washington, Dec. 8-11, promises to be one of unusual interest. When it adjourned last year at St. Louis, it was expected that the principal subject for consideration this year would be cholera; but fortunately the anticipated epidemic has not appeared, and other topics will therefore be discussed. The leading feature will be the award of prizes for the best essays on the following sub-

jects: Healthy homes and foods for the working classes, The sanitary conditions and necessities of school-houses and school-life, Disinfection and individual prophylaxis against infectious diseases, and The preventable causes of disease, injury, and death in American manufactories and workshops, and the best means and appliances for preventing and avoiding them. The prizes amount to \$2,800; \$500 for the first, and \$200 for the second. The money is the gift of Mr. Henry Lomb of Rochester. For these prizes fifty-two essays have been presented.

TO ANY ONE NOT FAMILIAR with the history of the Smithsonian institution, and the manner in which its natural history collections were administered in the days before the national museum was adopted by congress, it seems almost incredible that there should not have grown up under its care an extensive collection of insects. Still more strange must it appear that an establishment so rich as is the national museum in other branches of zoölogy should have been up to this time without a regularly organized department of entomology. The reasons for this it seems unnecessary to discuss in this place, further than to remind our readers that until very recently all collections and plants received by the Smithsonian institution have been turned over to the department of agriculture for administration. When it is remembered that the national museum was never recognized by that name in any act of congress until 1877, and that its present organization dates back only four years, some deficiencies may well be overlooked. The lack of a department of insects, established upon a permanent basis, has from time to time been made the subject of remark in the columns of *Science*, and it gives us pleasure to announce that steps have been taken toward the stable organization of such a department. It has already assumed an importance not unworthy of the dignity of a national institution. The gift by Dr. Riley of his fine private collection affords a nucleus around which materials will rapidly accumulate, and the appointment of a paid custodian of the collection will cause entomologists to feel that their specialty is to be properly represented in Washington.

THE RECENTLY ANNOUNCED FAILURE of the natural gas-wells of Champaign, Ill., indicates that the supply in the vicinity of Pittsburgh and elsewhere may not be inexhaustible, and may have aroused anxiety in the minds of those who have invested in this new form of enterprise. There is a great deal to be learned in regard to petroleum and natural gas, but a few points as to their origin and mode of accumulation may be counted settled. They are derived from organic matter distributed through the rocks in which they occur: in other words, they are fossil fuel, as really as coal or lignite. They were accumulated in subterranean reservoirs, which are mainly porous sandstones or limestones, covered with impervious shales; and there is no reason to believe that these accumulations are of recent date. A gas-well or oil-well can no more be 'inexhaustible' than a coal-mine. While oil is mobile, and can be drawn through the rocks for some distance to the point of delivery, gas is still more mobile, and may travel farther; but the supply of either or both from a given area is limited and definite. Single gas-wells will fail like single mines, but the *field* may last for a long time. The first anthracite mined in Pennsylvania was opened in a pocket of large extent. The proprietors counted it 'inexhaustible,' and a panic seized them when they found the rock floor beneath it, at no great depth. But a good deal of anthracite has been discovered since. The failure of one set of gas-wells has but little bearing on the life of another set, with other sources of supply, with other sorts of reservoirs, and with other conditions as to depth and geological structure.

THE PRESIDENCY OF THE ROYAL SOCIETY OF LONDON.

THE announcement in *Nature* (Nov. 5) that Professor Huxley has definitely resigned his position as president of the Royal society of London, and therefore as *official* leader of British scientific workers, will cause much regret not only in Great Britain and Ireland, but on this side of the Atlantic. This regret is increased by the further statement that the resignation was due to ill health, which made complete freedom from official cares desirable. The president of the Royal society has manifold and anxious duties. It devolves on him to present the claims of British science to the government, and he is officially responsible for the proper expenditure of

the annual grant made by the nation to the Royal society, for the furtherance of scientific research. He is, moreover, in a certain sense, the official adviser of the government in matters which involve scientific questions. Not technically a secretary of state, and fortunately without any political affiliations, upon him devolves, nevertheless, the duty of advising the cabinet on matters pertaining to science, and as to the selection of *regius* professors in scientific subjects in English, Scotch, and Irish universities. Of late years such official duties have been made more onerous by the anti-vivisection act, which names the president of the Royal society as one of the few persons who are entitled to certify that they believe the performance of experiments on the lower animals is justified by the aim of a particular research, and the character and training of the person who desires to make it.

In addition to the above official duties and anxieties, the president of the Royal society has exacting social claims. It devolves on him to see that distinguished foreign scientific men who may visit London are suitably entertained, and introduced to those whom they may desire to meet. The position, though, we believe, unpaid, is one of great responsibility, and involves much labor; and it is an open secret that Professor Huxley assumed it on the understanding that the secretaries should take the main bulk of the necessary work off his shoulders. His researches, his eloquence, his great 'common sense,' made him the natural head of British scientific men; and we trust that the day is far off when we shall cease to learn from him. We expect, now that he is set free from all routine duty, that we shall find him even more a protagonist than we have in the past. We hope that the newspaper rumor is true, and that he is coming to the United States to study the collections of fossil birds and reptiles gathered by Professor Marsh of Yale college, and give us, as no other is so competent to give, a statement of the bearing of these collections on the general doctrine of evolution. Should the master come to rest and work among us, he will surely meet a hearty greeting.

Professor Huxley was for several years the biological secretary of the Royal society. According to *Nature*, his successor is to be Professor Stokes of Cambridge, who has for many years been the mathematico-physical secretary. Who is to be the successor of Professor Stokes as secretary we do not know; but it is interesting to note that

as the Royal society started with a close affiliation to Oxford, then became, as regards its officers, for many years a London society, it now returns from London to one of the older universities for its officers. If Professor Stokes be made president (an honor which is certainly due him), the president and one of the two secretaries will be Cambridge men. This is an interesting example of the fact that the older English universities, now that they have been legally set free from ecclesiastical control, are coming to the front in scientific research. It gives point to the agitation now in progress in London for a 'teaching' university, and shows, that, once ecclesiastical fetters are removed, even the most ancient educational endowments can produce national leaders in the physical and biological sciences.

THE NOVEMBER MEETING OF THE NATIONAL ACADEMY OF SCIENCES.

THE meeting of the National academy of sciences, held this autumn in Albany, though even smaller than usual at this season, was interesting and successful. The meeting began on Nov. 10, and lasted four days. Only 18 of the 97 members were present, and 22 papers were read, 16 of them by members of the academy. The papers elicited an unusual amount of interesting discussion, and the sessions, held in the new and cheery assembly parlor at the capitol, were largely attended by the citizens, who, indeed, did every thing to make the meeting of the academy a pleasant one, with dinners and evening receptions. The local scientific institutions combined to receive the academy on the first evening, and the assemblage at Geological hall was a large and distinguished one.

Although the papers were divided almost equally between the physical and natural sciences, those in the former department were, generally speaking, both more important and of wider interest. They were almost exclusively astronomical; and prominent among them, as opening new fields of research, were the papers of Professors E. C. Pickering and S. P. Langley.

The former presented to the academy the results of researches he had undertaken in stellar photography in connection with his brother, Mr. W. H. Pickering, aided by a grant from the Bache fund of the academy. He clearly proved that owing to the recent improvements in photographic methods, and particularly by the advances in dry-plate manufacture, we had now a new tool in astronomy of the utmost importance. The first stellar photographs ever taken were those of α Lyrae by the elder Bond, at the Harvard observatory, in 1850.

In 1857 his son carried similar investigations much further. At first, however, they had been unable to obtain clear images of stars of the second magnitude, while now it was possible to print those of the fourteenth, or, in other words, to transfer to paper an image produced by an object only a hundred-thousandth part as bright as formerly. Professor Pickering's researches were carried on by means of a new instrument he had devised and constructed from the Bache fund, in which a photographic lens of eight inches aperture and forty-four inches focus is mounted equatorially, and moved by clock-work. By disconnecting the clock-work, photographs of several different regions may be taken upon the same plate, and the stars distinguished by varying the exposures.

Three different fields of investigation were here opened, each of which had been traced somewhat by way of exploration. One was a map of the heavens; a second, the study of atmospheric absorption; and the third, the study of stellar spectra, which, by these methods, may now be pursued with comparative ease. It was found that the negatives would show the lines of stars of the eighth magnitude perfectly, and that these spectra would even bear enlargement upon paper with clear definition. As the only limit of the further extension of stellar photography is the sensitiveness of the dry plate, and as this limit is plainly not yet reached, even better results may be expected.

Many photographs were exhibited, and great interest was manifested in this new departure, as well as in the simple, effective, and time-saving devices of the author for direct comparison on the same plate of a large number of objects for photometric purposes.

Professor Langley's paper related to 'obscure heat,' and continued, as was expected, his remarkable researches with the bolometer, by which he has so greatly extended our notions of the invisible spectrum. This time he dealt with the lunar spectrum, and estimated the heat derived from the unilluminated moon. Rosse had estimated the temperature of the moon's surface as from 200 to 500° F. By studying the moon at its full with a rock-salt prism obtained only after repeated failures, and which, from its nature, had already required repolishing seven times, each time necessitating a new determination of its constants, he had succeeded on repeated occasions in securing a spectrum which showed two curves, — one according with that previously obtained in the infra red region beyond the visible portion of the solar spectrum, and clearly due to reflection; and another, lying entirely beyond that, as clearly due to the moon itself, and revealing its real temperature.

This, as shown by studying the spectrum of frigid masses, is colder than the temperature of melting ice.

By comparing the mean of the spectra obtained in summer with that of those obtained in winter, it is evident that a much greater amount of heat is received from the moon in winter than in summer. This may simply be due to the greater amount of aqueous vapor in our own atmosphere in the summer, as contrasted with the winter clarity. By directing the bolometer to the zenith and to the horizon, the temperature of space has also been measured by direct experiment for the first time, and the amazing transparency of our atmosphere to radiation of the earth's heat revealed; for his experiments show that our atmosphere transmits the earth's heat more readily than the sun's.

Professor Newcomb discussed the subject, 'When shall the astronomical day begin?' He took the ground that the inconvenience arising from the discordance between the civil and astronomical measure of time had been greatly exaggerated. It depended, not upon the number of people who had to use the one time, nor upon the number who had to use the other, but upon the number of times one had to be changed into the other. As an illustration, he said that the inhabitants of the planet Mars might use one reckoning of time, and we another, without the slightest inconvenience to the inhabitants of either planet. On the other hand, the proposed change of the beginning of the astronomical day from noon to midnight would be productive of confusion both to ourselves and our successors, the end of which it would be hard to see. It was, in fact, nothing less than a change in language: it was proposed that 'three hours mean time' should hereafter mean what 'fifteen hours' had hitherto meant, and *vice versa*. He explained, however, that his objections applied only to that resolution of the International conference which proposed to change the beginning of the local astronomical day to midnight, and that he made no objection to the introduction into astronomy of the universal day, beginning at Greenwich midnight, provided that this reckoning of time was expressed in language which would clearly distinguish it from any other.

Professor C. H. F. Peters sustained the view of Professor Newcomb, while Professors Young and Graham Bell opposed it. Professor Young held that the introduction of civil time into astronomical reckoning would be a great convenience in designating without ambiguity the times of observations, especially those made in the forenoon; he cited cases in which correspondents had written to him to inquire on which day such observations

had been made. He considered that the public at large were ready to adopt the recommendations of the International conference, and that astronomers should not be behind them in doing so.

Professor Bell held that there were three strong reasons for the adoption of the change. The first was that the Meridian conference which proposed it was called by our government, and that we were bound to follow its recommendations. Another reason was that the astronomer royal at Greenwich had adopted the new reckoning at the beginning of the present year, so that the reform was secure if Americans would only follow his example. Third, he considered that ambiguity would be avoided in the records of astronomical or other events. For example, beginning the day at noon, it might happen that an eclipse of the sun occurred before noon at one place, and after noon at a place farther east. Then the historian of the future might be perplexed by finding the eclipse recorded in one place as beginning on one day, and in another place as beginning on the day after.

In reply to Professor Bell, Professor Newcomb called attention to the case when an eclipse of the moon would be observed before midnight at one place, and after midnight at another. So that if the day began at midnight the same trouble would arise that Professor Bell had pointed out in regard to the solar eclipse.

In reply to Professor Young, he said that in order to bring the astronomical and civil reckoning of time into accord it was necessary either that astronomers should subdivide the day into A.M. and P.M., or that the general public should count the hours up to twenty-four. He considered neither course feasible.

Other astronomical papers were read by Mr. O. T. Sherman, who exhibited spectra of β Lyrae and γ Cassiopeiae, showing the existence of bright lines which coincide closely with those of the solar chromosphere; by Prof. C. H. F. Peters, who believes that he has been able to make a plausible hypothesis for each of the twenty-two stars observed by Flamsteed, which were afterwards supposed to be lost; and by Prof. C. A. Young, on the fading star in the nebula of Andromeda, which he had found also to be of variable color.

On the biological side, the chief interest centred in the exposition, by Dr. A. Graham Bell, of the first results of the investigations it had been known he was making in hereditary deafness. A report of this paper will appear in *Science* of Nov. 27.

Space prevents our entering into detail concerning other papers which had mostly only a technical interest. A complete list will be found in our notes. The next meeting will be the annual session at Washington, in May, 1886.

ENTOMOLOGY IN THE NATIONAL MUSEUM.

ALTHOUGH the department of insects in the national museum was organized three years ago, little has hitherto been attempted beyond the care-taking necessary for the preservation of the material already on hand; the honorary (or unpaid) curator of the department, Dr. C. V. Riley, having had comparatively little aid from the museum appropriation in the matter of construction of cases or the employment of assistants. At the beginning of the present fiscal year a salaried assistant-curatorship was established, to which Mr. John B. Smith was appointed. Additional accommodations in the laboratory and exhibition hall have been provided, and the study-collections and the exhibition series are now being rapidly extended.

In October Dr. C. V. Riley formally presented to the museum his private collection of North American insects, representing the fruits of his own labors in collecting and study for over twenty-five years. This collection contains over 20,000 species, represented by over 115,000 pinned specimens, and much additional material unpinned and in alcohol.

This generous gift to the government has long been contemplated by Dr. Riley, whose ambition it is to be, so far as possible, instrumental in forming a national collection of insects, and with the belief that his collection will form an excellent nucleus for future accumulations. In his letter of presentation he remarks, —

"While the future of any institution dependent on congressional support may not be so certain as that of one supported by endowment, I make this donation in the firm belief and full confidence that the national museum is already so well established in public estimation that it must inevitably grow until it shall rival and ultimately surpass other institutions in this country or the world as a repository of natural history collections.

"If there shall in the future result the concentrating here at the national capital of the extensive entomological material which naturally comes here, and which in the past has been scattered among specialists in all parts of the country, so that in the future the student may find valuable material to further his work in any order, I shall feel amply rewarded for the action I have taken."

A recent census of the national collection of insects has been taken, the specimens in each box having been counted. A summary of the results follows: —

The collection of Dr. C. V. Riley. — This collection contains the following pinned and mounted specimens:

	Boxes.	Specimens.	Species.
Hymenoptera.....	66	24,796	2,650
Coleoptera.....	127	43,613	6,558
Lepidoptera.....	338	17,098	2,308
Diptera.....	21	5,646	699
Hemiptera.....	59	8,862	1,184
Orthoptera.....	64	6,903	560
Neuroptera.....	14	868	169
Arachnida and Myriopoda....	2	425	110
Insect architecture.....	16	1,080	178
Miscell. (not yet arranged)....	28	1,610	178
Galls and gall insects.....	31	4,152	734
Total, pinned.....	766	115,058	15,328

The collection also contains some 2,850 vials of alcoholic material, chiefly of the adolescent states of insects, in many cases several species being contained in a single vial. The early states of the minuter insects are mounted in balsam on slides, of which the collection contains upward of 3,000, most of the slides holding the contents of three cover-glasses.

The mounted specimens are all duly classified and labelled, and in excellent order and preservation. The labels include notes as to locality and food-habit, and are also in many cases numbered to correspond to detailed notes as to adolescent states and habits. The collection embraces few exotic species, and is more particularly rich in biological material, containing more blown and alcoholic larvae and pupae in connection with their imagos than perhaps any other collection of North American insects. Including the unarranged and alcoholic material not connected with the pinned specimens, there are over 20,000 species in the collection.

Collection of the department of agriculture. — This collection comprises some 500 folding boxes, and 123 odd boxes, many of them but partly filled, and duplicating in a great measure those in the Riley collection. It also contains a large assortment of slides and alcoholic specimens accumulated during the past seven years.

Three hundred of the folding boxes contain a tolerable, classified collection, chiefly of Coleoptera and Lepidoptera. The other boxes contain all the more recent material collected for, or reared at, the department, and include the Brazilian collection of Dr. J. C. Branner and Mr. Albert Koebele. This material is separated by orders, but not yet carefully worked over or classified. They also include some few purchases from Messrs. H. K. Morrison and Wm. Wittfeld, the exotic Coleoptera from the administrators of the Belfrage estate, and the Burgess collection of Diptera.

This collection includes many undescribed species in all orders; and a rough estimate indicates that there are about 50,000 specimens, and probably 5,000 species, mostly exotic, not in the Riley collection.

The collection of the national museum proper. — This comprises all the material received during

the past three years. There are some 50 folding boxes, and some half dozen drawers of pinned and mounted specimens. These consist chiefly of exotic species, and mostly of the showier Lepidoptera sent to the museum because of their brilliancy, and without name. There are also about 100 bottles of various sizes, containing alcoholic material, much of it exotic, and considerable material of value as illustrating insect architecture. A rough estimate shows about 20,000 specimens, and 2,000 species not in the other collections.

Exhibit collection of economic entomology.—This collection, prepared for the New Orleans exposition, and a catalogue of which has been published, will be deposited in the museum. It is made up of the following sections: 1°. Insects injurious to agriculture (arranged according to the particular plant, and the particular part of the plant, affected). 2°. Insecticides. 3°. Insecticide machinery, and contrivances for destroying insects. 4°. Bee-culture. 5°. Silk-culture.

From the above statement it is evident that there are already something like two hundred thousand mounted specimens in the national collection, comprising some twenty-six thousand distinct species. This, together with the vast amount of alcoholic material already indicated, will serve to show its fulness.

REPORT OF THE POINT BARROW STATION.

THIS volume, which contains the report of Lieut. Ray's party at Point Barrow, 1881-83, is notable in several respects, and creditable to all concerned. It has been prepared by Lieut. P. H. Ray, U.S.A., and Prof. John Murdoch of his party, with the assistance of several experts. It is not necessary to rehearse the object and relations of the expedition, which have been repeatedly referred to in the pages of *Science*. The report begins with a statement of the orders and instructions under which the work was done. This is followed by a narrative by Lieutenant Ray of the transactions at Point Barrow, or rather the station Uglaiami near the Point, of his explorations of the Meade River, and of the voyage to and from the station. This narrative is unpretentious and interesting, and terminates with a hearty recognition, by the commander, of the qualities shown by the members of his party during the monotony and privation of their long exile. Lieutenant Ray also furnishes an ethnographic sketch of the natives of Point Barrow, which will be found entertaining reading, and is illustrated by some excellent heliotypes,—the

best, indeed, we have seen from photographs made in this part of the arctic regions. They give very satisfactory views of the station, the grounded ice, the natives of Uglaiami, and of the village of Iliiliuk, Unalashka, at which the expedition touched. There is also a census and vocabulary of the Innuut of Uglaiami, and a list of the ethnological specimens obtained by the party, to the illustration of which several plates are devoted. Part iv. contains the natural history prepared by Professor Murdoch, assisted by Professors Asa Gray and C. V. Riley, Messrs. Fewkes, Dall, and others. The Innuut name of each animal is appended when known. The mammals, birds, and fishes are treated by Murdoch, and illustrated by two very successful colored plates of the beautiful rosy gull, *Rhodostethia rosea*. Professor Riley contributes some notes on the scanty representatives of insects; Professor Gray, others on the plants; Fewkes and Dall report on the aculephs and mollusks respectively; while Murdoch discusses the other marine invertebrates, especially the crustacea, of which some new species are described and illustrated. With the mollusks is given a heliotype plate of some critical species of *Buccinum*, with magnified drawings of the minute surface sculpture. The collection afforded several new forms of shells. There are notes on the collecting stations, and a useful bibliography of works consulted.

The fauna, as might be expected, is purely arctic, and has little in common with that of the North Pacific.

The meteorology, including auroral observations, follows, and naturally occupies many pages. Mr. C. A. Schott, of the U. S. coast survey, reports on the magnetics, a field where he is *facile princeps*. The tidal observations are given in full, with an illustration of the apparatus used. The rise and fall of tide is only six or seven inches, but during the time observations were carried on the level of the sea varied some three feet, a change due probably to differences of atmospheric pressure. The report closes with some observations on ground currents and on the thickness of the ice. The maximum of thickness was five feet two inches on the sea, reached in March, and six feet two and a half inches on the quieter surface of an adjacent lagoon, reached in May. There is a fair index. The preceding summary will indicate how rich a store of information the report affords for students of arctic matters, though some very valuable material is still in course of elaboration for future publication. Space fails us to discuss the questions arising from the investigation of the flora and fauna. It is evident, however, that so successful a sojourn and safe return, so

Report of the international polar expedition to Point Barrow, Alaska. Washington, Government, 1885. 695 p., illustr. 4°.

satisfactory collections, and so prompt and useful a report, could not have come about without qualities of a high order in both the party and its chief. That the magnetic and astronomical observations were less precise than could be wished seems to have been the result of circumstances beyond the control of the members of the party.

HORSE-BREEDING.

M. ALASONIERE has written a very sensible little book upon horse-breeding, which has been honored with a medal by the French national agricultural society. He gives first a discriminating account of the points which mark a good horse, and then proceeds to characterize the two principal equine types, *speed* and *strength* being their respective characteristics, or, according to his more elaborate definition, 'type à étendue de contraction' and 'type à intensité de contraction.' His central idea as to the breeding is that the two types should not be mingled, because in the offspring incongruity results, one part of the animal inheriting its qualities from the mother, another part from the father. The wisdom of this precept he enforces by a discussion of the rules to be followed for the amelioration by breeding of special parts of the animal, and maintains that injudicious mixing of the two types produces horses of an incongruous build. To put the matter more bluntly, to get good colts the mare and stallion should resemble one another, else the colt will be a hodge-podge of qualities not harmonious.

The treatise is pleasantly written, and, though not properly a scientific work, is still valuable for, if we may be pardoned the phrase, its good horse sense, and we take pleasure in commending it to the notice of those engaged in rearing horses in this country.

ELECTROTECHNICAL HANDBOOK.

DR. KITTLER'S book, of which the first part of vol. i. has just appeared, will be welcomed by every one who has to do with any of the applications of electricity to the arts. It begins with a consideration of the phenomena and laws of induction, giving particular attention to the special cases that are of importance in the operation of the telephone and dynamo-machine, and then proceeds to discuss at length the various separate parts of the dynamo-machine, and indicates the points especially to be observed in their construc-

Amélioration de l'espèce chevaline par des accouplements raisonnés. Par L. ALASONIERE. Paris, Baillière, 1885. 15+156 p. 8°.

Handbuch der elektrotechnik. Bearbeitet von Dr. E. KITTLER. Stuttgart, Enke, 1885. 8°.

tion. The circumstances influencing the magnetization of soft iron—as the dimensions of the piece, the strength of the magnetizing current, and the quality of the iron—are next analyzed. Most of the remainder of that portion of the book as far as issued is occupied by a lengthy and detailed description of the principal forms of electrical measuring instruments. Their theory and construction are somewhat minutely considered, and most of the important special forms of instrument are figured. A list of a few of these will best show the character and completeness of the work. We notice, among others, Kohlrausch's bridge for use with a telephone, Siemens's modification of Thomson's bridge for measurement of low resistances, several forms of Wiedemann's galvanometer with copper dampers, Obach's cosine galvanometer, Siemens and Halske's convenient form of Thomson's mirror galvanometer, and D'Assarval and Deprez's aperiodic galvanometer. All of the leading forms of current and potential galvanometers for technical purposes are described, including several which we have not seen elsewhere, except in the original papers.

The work is written (as should be the case with a work of this kind) for students possessing a good knowledge of physics and mathematics. It would be of great advantage to American students of electrotechnics if some of our publishers would issue a translation of this work. We are sure that it would meet a much-felt want.

FROM PALERMO TO TUNIS.

ONE of the pleasantest of the many delightful trips aside from the beaten track—to which Americans in Europe carefully cling—is that from Naples to Tunis by way of Palermo and Malta. Besides seeing the Sicilian capital—a splendid city in itself and renowned throughout Italy for the beauty of its women—and Malta, the dwelling place of one of the most remarkable races of the Mediterranean, one gets a glimpse of oriental life in all its filth and picturesqueness for a fraction of the time and money required for a visit to Cairo or Constantinople.

With regard to Malta, the fact which most impressed itself upon M. Melon's note-book—for this little volume pretends to be nothing but a collection of notes—was the signal failure of the English to assimilate the native population. To use his own words: "After eighty years of domination the line of demarcation between the Maltese and the English, their masters, is as sharply defined as on the first day." The greater

De Palerme à Tunis. By PAUL MELON. Paris, Plon, Nourrit & Cie, 1885. 212 p., illustr. 12°.

part of the book, however, is devoted to a description of Tunis and neighboring towns. Of course whatever a Frenchman writes about such a recent acquisition as Tunis must be received with caution, and much that is here said about the Roman ruins is probably exaggerated. The old Phœnician Carthage has entirely disappeared, and of the Roman town but little remains. Utica, too, is no more to be seen, and, in fact, the province of Carthage—once the granary of imperial Rome—is little more than a desert. Still as our author says: "Although there is scarcely a vestige of Carthage remaining, its site alone attracts the tourist to the top of the ancient Brysa." In conclusion, it may not be amiss to point out that the traveller who designs visiting Tunis for the sake of viewing eastern barbarism would better bestir himself, as the French are reported to be improving the place in the true Parisian fashion.

GEOGRAPHICAL NOTES.

A DISCUSSION of the hydrographic observations made on the expedition of 1883 to Greenland seas has been published by Nordenskiöld and Hamberg in the Proceedings of the Royal geographical society. There are numerous water sections; and the discussion is of much value and interest for the hydrographer, but too extensive to summarize here.

During the past summer, Captain David Gray, the well-known whaler and explorer, visited the east coast of Greenland at a high latitude. The flocs extended this year very far west from Spitzbergen, at least 180 miles at Prince Charles Foreland. In latitude 74° the edge was in longitude 14° W.; and in latitude 71° , in 16° W. In August he sailed along the coast from Shannon Island to the entrance of Scoresby Sound, a distance of three hundred miles, sometimes in sight of the land-water, and sometimes farther off. On the Liverpool coast he passed between the land-ice, but found no whales. The land-ice was sufficiently open for a steamer to have forced her way through it, which is very rarely the case so early in the season.

The Danish expedition to east Greenland has returned to Copenhagen after an absence of twenty-nine months. The latitude reached was $66^{\circ} 8'$, about forty miles farther north than Nordenskiöld's vessel attained in 1883. There have been no casualties, and the health of the party is excellent. Many photographs and interesting ethnological objects were brought back. Lieutenant Holm, commanding, considers that it is now settled beyond a doubt that no early Scandinavian remains occur on the east coast.

'Island, land und leute, geschichte, litteratur und sprache,' by Dr. Ph. Schweitzer, has been published by W. Friedrich in Leipzig. There has been no complete work on Iceland in the German language hitherto; but the present one does not seem in all respects satisfactory, and parts of it are characterized as unscientific and fanciful by German critics.

A very useful and complete atlas of Russia has been prepared by J. Poddubnyi, and published by A. Deubner, St. Petersburg, under the title of a 'Russian school atlas,' at the small price of one ruble. It would seem to be far more than an ordinary school atlas in the sense commonly understood, and to be well worthy a place in the library of all interested in geography; being full of maps showing meteorology, distribution of races, religions, etc., and many diagrams.

J. Hughes and F. Dunsmuir have returned to Juneau, Alaska, from the head waters of the Yukon. They descended the Lewis branch to the Salmon River, which was ascended to its head waters. Good placers were found on the bars. Some twenty prospectors will remain in the region all winter. They were said to average seven or eight dollars a day per man in gold dust. These diggings are mostly in British territory.

News from the whaling fleet to Nov. 3 states that one hundred and seventy-four whales had been taken. No further casualties are reported, and the vessels are beginning to arrive at San Francisco.

Lieutenant Allen and party of the Copper River expedition, now returned, are said to be seriously affected by scurvy, due to their privations.

The revenue cutter Bear, formerly of the Greely relief expedition, has sailed from New York for the western coast, where she will be employed in Alaskan waters on revenue duties, and to assist disabled vessels of the whaling fleet during the season. She will hardly reach San Francisco before February, 1886.

Lieutenant Greely is in Scotland, the guest of Lord Roseberry, and is to deliver an address before the Scottish geographical society Nov. 19. His health is said to be improving.

Dr. Stejneger of the national museum has an illustrated article on the Commander Islands, containing much of interest, in the last number of the *Deutsche geographische blätter*.

ASTRONOMICAL NOTES.

Spectral analysis of atmospheric elements.—M. Janssen announces (*Comptes rendus*, ci. 649) that he has taken up the special study of the absorption spectra of gases, mostly those composing

our atmosphere. The observatory at Meudon has special facilities for this work; and already in a tube of oxygen 60 metres long, under a pressure of 27 atmospheres, M. Janssen states that there are absorption phenomena visible beyond A, and some bands in other parts that are not in the solar spectrum. These he attributes to the increase of pressure over that of our atmosphere.

Personal equation in observing circumpolars.—In rediscussing Wagner's Pulkowa transit-observations of Polaris, 51 (H) Cephei and δ Ursae Minoris, to determine the constant of nutation, Dr. L. de Ball finds an interesting and strikingly constant difference between the right-ascensions observed by 'eye-and-ear' and on the chronograph. His results are as follows:—

Method.	α Ursae Minoris.	51 (H) Cephei.	δ Ursae Minoris.
	s. s.	s. s.	s. s.
Eye-and-ear...	88.71 $\pm$ 0.043	11.72 $\pm$ 0.026	53.08 $\pm$ 0.020
Chronographic	89.06 $\pm$ 0.051	12.01 $\pm$ 0.027	53.36 $\pm$ 0.020

The above are the seconds of right ascension for 1865.0.

Latitude of the Bordeaux observatory.—M. Rayet has determined (*Comptes rendus*, ci. 731) the latitude of the new observatory at Bordeaux to be $+44^{\circ} 50' 7''.23$; but as it rests entirely upon measures of the zenith-distance of fundamental stars, and as there appears to have been no investigation of flexure or of constant error in the nadir-point, it may possibly be in error by some tenths of a second.

Asteroids 251 and 252.—The asteroid discovered by Palisa on the 4th of October (*Science*, vi. 333), while searching for Eudora, turns out to be a new one, and is accordingly number 251. Eudora was observed at Vienna on October 4—11.3 magnitude. Perrotin's new asteroid of October 27 becomes number 252.

The total solar eclipse of 1885, September 9.—The last number (835) of *Nature* gives several letters from observers of the recent eclipse of the sun visible in New Zealand. There are no reports from the government parties organized by Mr. Ellery, but it is stated that bad weather seriously interfered with their observations. Mr. Graydon made a series of sketches of the corona from Tahoraite, — a point well within the belt of totality, but some forty miles north of the central line. Five sketches were made during the short time of totality, and their agreement confirms the observer's impression of the fixity of the phenomenon. A woodcut from these sketches shows five or six long rays (besides a large number of shorter ones) projecting from the sun's limb, the longest ray being some two or three diameters of that body in length. A dark rift was

observed in the corona, and near this rift a red flame was noticed by some of the bystanders to shoot out just before the end of totality. Ten instantaneous photographs were obtained by a party at Blenheim; and at Masterton "Messrs. McKerrow and party, who had camped at the foot of Otahuaio, proceeded to the top and fixed their instruments amid driving snow and hail." They were rewarded by the sky clearing off just before totality, and four photographs were obtained. Other observations were made at Wellington and Dryertown.

NOTES AND NEWS.

THE following papers were entered to be read at the meeting of the National academy of sciences in Albany, beginning Nov. 10: S. P. Langley, Obscure heat; John S. Billings, A new form of craniophore, for taking composite photographs; A. S. Packard, The carboniferous merostomatous fauna of America; E. C. Pickering, Stellar photography; E. D. Cope, Two new forms of polyodont and gonorhynchid fishes from the eocene of the Rocky Mountains; (by invitation) O. T. Sherman, Yale college observatory, New lines on the spectra of certain stars; C. H. F. Peters, Certain stars observed by Flamsteed, and supposed to have disappeared; James Hall, Remarks upon the international geological congress at Berlin, with a brief historical notice of the origin of the congress; James Hall, Notes on some points in the geology of the Mohawk valley; Simon Newcomb, When shall the astronomical day begin? (by invitation) William B. Dwight, Primordial rocks among the Wappinger valley limestones, near Poughkeepsie, N.Y.; C. H. F. Peters, The errors of star catalogues; A. Graham Bell, Preliminary report on the investigation relating to hereditary deafness; C. A. Young, The new star in the nebula of Andromeda; (by invitation) J. A. Lintner, Recent progress in economic entomology; J. W. Powell, Remarks on the stone ruins of the Colorado and the Rio Grande; (by invitation) Charles H. Peck, The New York state herbarium; (by invitation) T. H. Safford, The formation of a polar catalogue of stars; (by invitation) Otto Meyer, A section through the southern tertiaries; James Hall, Remarks upon the Lamelibranchiata fauna of the Devonian rocks of the state of New York, and the results of investigations made for the paleontology of the state; J. S. Newberry, Recent discoveries of gigantic placoderm fishes in the Devonian rocks of Ohio; J. S. Newberry, The flora of the cretaceous clays of New Jersey.

—The American public health association will convene at Washington, D.C., Tuesday, Dec. 8,

at 10 o'clock A.M., and continue four days. The meetings will be held in Willard's hotel hall, on Pennsylvania Ave. The executive committee have selected the following topics for consideration at the meeting: 1°. The best form in which the results of registration of diseases and deaths can be given to the public in weekly, monthly, and annual reports; 2°. The proper organization of health boards and local sanitary service; 3°. Recent sanitary experiences in connection with the exclusion and suppression of epidemic disease; also the Lomb prize essays. In addition to other able and comprehensive papers expected to be presented at this meeting, the secretary has received notice of the following: Dr. J. S. Billings, Forms of tables for vital statistics; Dr. E. M. Hunt, Sanitary and statistical nomenclature; Dr. Charles H. Fisher, Statistics of consumption in Rhode Island for a quarter of a century; Dr. E. M. Hartwell, The German system of physical training; Dr. William Oscar Thraillkill, School hygiene, public and private; Dr. Joseph Holt, Sanitary protection of New Orleans, municipal and maritime; Dr. S. T. Armstrong, Maritime sanitation; Dr. P. H. Bryce, Small-pox in Canada, and the methods of dealing with it in the different provinces; Dr. Benj. Lee, The debit and credit account of the Plymouth epidemic; Dr. C. A. Lindsley, An epidemic of typhoid fever; Dr. O. W. Wight, Experiences in disinfecting sewers; Dr. J. N. McCormick, Progress of health work in Kentucky; Dr. Thomas F. Wood, Observation on the Cape Fear River water as a source of water-supply: A study into the character of southern river water; Dr. D. E. Salmon, The virus of hog cholera; George N. Bell, Hygiene of the dwelling; Dr. John Morris, The proper disposal of the dead; Dr. A. C. Bernays, The relation between micro-organisms and cells; Dr. W. H. Watkins, The layman in sanitation; Dr. R. Harvey Reed, Who is responsible for the iniquities of the third and fourth generations, and how shall they be avoided? Dr. W. John Harris, Carelessness the cause of disease. The committee on disinfectants will present quite a voluminous report (printed), embodying their investigations and conclusions on the subject of disinfection and disinfectants.

—The Massachusetts teachers' association will hold its forty-first annual meeting in the Girls' high school building, Boston, on November 27–28. The two volumes recently published by the association—the first a history of the association from its organization in November, 1845, with an abstract of its proceedings (1845–80); and the second a continuation of the above, with the ad-

resses at the annual meeting in 1882 in full—may be obtained at twenty-five cents each, upon application to the treasurer, Alfred Bunker, Boston.

—Prof. E. Hitchcock writes from Geneva, N.Y., to announce that a portion of the skeleton of another mastodon has just been unearthed in Seneca Castle, N.Y., about five miles from Geneva. It was found, as is usual, at the bottom of a peat morass lately drained for farming purposes. The aggravating thing to the naturalist is that the bones most decisive in determining the species were not found, though all were remarkably sound and strong. The left tusk measured eight feet nine inches on its outer curve, and evidently was not the whole tusk. The two styloid bones were well preserved. The rest of the bones were vertebrae, about one-half the ribs, and many of the bones of the hand and foot, but no head or pelvis. The bones were discovered through Mr. F. B. Peck, a senior in Amherst college, and they are the property of this institution. The peat and muck were only three feet thick, which must account for the scarcity of the large bones.

—Capt. Charles Haley, of the schooner *Genevieve*, recently arrived at Philadelphia from Charleston, S.C., reports that on Oct. 29, at 10.30 A.M., when about thirty miles south of Frying Pan Shoal lightship, he had his main and mizzen masts carried away about twenty feet below the cross-trees. The weather was clear and pleasant, moderate swell, light breeze from W.N.W., and vessel going through the water at about four knots, heading N.E. by E., with all sail set. Noticing a small cloud to windward, of cirro-cumulus formation, and hearing a sizzling sound aloft, he sang out to clew up the topsails. The next moment the topsails gathered up in a bunch, and the main and mizzen masts were twisted off and taken overboard. At the same time the jib and foresail were flapping to windward with each roll, and he could have held an open umbrella over his head, there was so little wind. A few minutes afterward the sun came out bright and clear. About 2 P.M. the same day a gale sprung up from S.W., and blew for twenty hours. The mate said the small cloud that came down from windward looked like the first appearance that a cloud generally assumes when a water-spout is beginning to form.

—A New York *Herald* despatch of Nov. 16 announces that Vesuvius is again in a state of eruption. The lava is streaming down on the west side of the mountain, and some alarm is expressed, as the observatory authorities believe that

the eruption will become more serious than it is at present.

— In the second part of the first volume of the 'Supplementary papers' issued by the Royal geographical society there is a valuable map of central Asia, showing the territory between the Zarafshan and Amu-Daria Rivers. It was compiled from the latest Russian documents to illustrate Mr. E. Delmar Morgan's paper on the 'Recent geography of central Asia from Russian sources.' The map extends only to about $72^{\circ} 30'$ of longitude east from Greenwich, and therefore does not take in the sources of the Amu-Daria or the Oxus. Nevertheless, as it shows the glaciers of Tanimar and Fedshenko, and the hitherto almost unknown mountain regions of Badakshan, Bokhara, and Karateghin, it is of very considerable value. Mr. Morgan's article, containing as it does much information hitherto inaccessible to English readers, should also be borne in mind.

— The French government has just created, says *Nature*, a certain number of travelling-juries. This is a modified form of an institution established by the first republic. In the organic law of the Institut it was ordained that the Institut was to select yearly ten citizens to travel abroad and collect information useful to science, commerce, and agriculture. These scientific travellers will not be appointed by the Academy of sciences, or the whole Institut, but by a special administrative commission, on the basis of a competitive examination.

— A German traveller who has recently visited Macedonia makes, says the *London Times*, the following statement respecting the population of that country: "If people speak of the condition and the movement in Macedonia, they should be reminded that this Turkish province is perhaps the most checkered picture of nationalities of any country in Europe, and that not one of them possesses an absolute majority. In the east, round Salonica, and along the coast, the Greek element is very strong; but even the largest seaport place might be considered a Jewish town rather than a Greek centre. The west is the stronghold of the Albanians,—the most savage, most aboriginal, and most lawless nationality of our part of the globe. A considerable Slav population pushes itself between the Greeks and Arnauts; and distributed among Greeks, Slavs, and Arnauts, we find a large number of Turks and Wallachians. The latter are called in Macedonia mostly Zinzaras, or Tsintsaras, because in their dialect they do not pronounce the number five 'tchintch' (like their kin of Roumania), but 'tsints.' With regard to the number of the population as a whole and

separately, it may safely be asserted that the various statements are entirely unreliable, the degree of exactness varying with the views and sympathy of the several authorities who make them. When a Russian general estimates the number of Bulgarians in Macedonia at 1,500,000, this figure may be as much assailed as the claim of the Greek notables when addressing a manifesto to the patriarch and the Porte, to be considered the representatives of 800,000 Greeks living in the province. If Macedonia is mentioned as the seat of political agitation, the Albanian districts of Janina and Scutari must be left out of consideration altogether. The other four great administrative districts remaining—Monastir, Salonica, Kossovo, and Seres—are stated to contain, in accordance with the proportionately most reliable figures, about 1,531,000 inhabitants, who are divided as follows: 410,000 Christian and 46,000 Mohammedan Bulgarians (Pomaks), 350,000 Albanians, 280,000 Turks, 145,000 Greeks, 120,000 Servians, 95,000 Zinzaras, and 40,000 Spanish Jews. The remainder consists of gypsies and foreigners. It may be added that the number of Albanians and Turks is probably taken too high; that of the Servians, on the contrary, too low."

— An expedition, under Dr. Bunge and Baron von Toll is to start next spring for the exploration of the New Siberian Islands, which, since Anjou's journeys in 1821–23, have only been visited by the ill-fated members of the Jeannette expedition, on their way to the mouth of the Lena.

— A French journal has recently called attention to the following good case of 'mental suggestion.' On July 14, 1884, Mlle. A. E. was put into the hypnotic condition by a friend who tells the story, and who says to her, "On Jan. 1, 1885, at 10 A.M., you will see me; I will come to wish you a happy new year; after this I will immediately disappear." Neither spoke of this until after Jan. 1. On that day Mlle. A. E. was in Nancy, and the narrator in Paris. "At 10 o'clock she heard a knock at the door, and saw me enter, and heard me wish her a happy new year in a loud voice, and suddenly disappear. She went to the window to see me as I went out of the door into the street, but I was not to be seen. In telling the story to a friend, she expressed surprise at seeing me in a summer suit of clothing at that time of the year. Of course, it was the suit I wore on July 14. In spite of my affirmations, she insists that I was really with her on New year's day."

— Reporting on the trade of Tamsui, China, the English commissioner of customs says that the trade in camphor is represented in the returns by such an insignificant figure that there is great

fear of its total extinction in the near future. The immediate cause of its rapid collapse may be traced to the eagerness of the Chinese to acquire by all possible means as much territory as possible. During the last three years hills thickly wooded with camphor trees have been burned over by the Chinese, in order to compel the savages to withdraw. Destruction on so large a scale, naturally tells on the camphor trade. Forests of camphor trees do still exist farther inland, but the absence of all beaten tracks across the mountains renders them difficult of access.

— M. Parize, director of the agricultural station of North Finistère, in Spain, reports a curious phenomenon resulting from the explosion of a tempered glass crucible. He heard one day a violent explosion in his laboratory, and, hastening into the room, saw on the table and floor, in a circle, a layer of glassy *débris* resembling crystals of sulphate of soda. The explosion was caused neither by a blow nor disturbance of the air. The grains varied in size from the head of a pin to a pea, with a few as large as a nut, but these were divided by cracks which would break them into analogous grains. An inkstand of pressed glass exploded in a similar manner not long ago in Boston.

— The small volume just published by Prof. Rudolph Eucken of Halle, entitled 'Prolegomena zu forschungen über der einheit des geisteslebens,' and which is published as the methodological part of a forthcoming comprehensive work on the subject, is as remarkable a bit of philosophical word-mongering as we have lately seen. The author is an expert in terminology, and in this thick pamphlet advances from the history of terms to the invention of them. Instead of psychological he proposes the term 'noological' as more comprehensive because including spirit. Instead of system, the word 'syntagma' is introduced to include large collective tendencies and unities of action as well as of thought. 'Innensicht,' 'voll-that,' 'arbeitswelt,' 'kombinierendes thun,' which are hardly translatable, and many far more familiar words, are given a precise and technical not to say strained meaning, as instruments to help the author in the impending self-delivery of his system. His problem is stated in so manifold ways—is so hard for him to state in fact—that its solution must be difficult indeed. It is, in general, whether there is a unitary character to mental life and the world; whether one force animates all the fulness of being; or, again, whether the universe is one collective act, or fact, with any character so distinctive that it may be described. The texture and quality of the thought is thin and poor. There is no index to speak of, no *résumé*,

and little promise of reward to the diligent reader.

— Aug. Boltz concludes, in a pamphlet on 'The Cyclops, an historical people, deduced from language,' that Cyclops is a perverted form of Siclos, or Sículos, the name of an Italo-Pelagic tribe inhabiting the eastern portions of Sicily; and that it has no proper etymological connection with the words *κύκλος* and *ὄψ*. Nevertheless, he thinks that the mythological one-eyed giant of Homer may have originated from some instance of natural monstrosity in real life, that had been encountered by the first Greeks who visited the island.

— In a paper read before the Anthropological institute of Great Britain, Sir J. Park Harrison has stated that, according to his observations, among the English the great toe is longer than the second; but as the ancients have represented in statuary the second toe as the longer, this must have arisen from a different proportion prevailing in Greece and Italy. Barroil finds (*Arch. per l'antrop.*, vol. xv.), however, as the result of 447 measurements of Italians, that 62 per cent have the great toe longer; and although it is true that, of twelve antique statues in the galleries of Florence, all but two have the second toe longer, he thinks this has arisen from a conventional feeling, which regarded that shape of the foot as more beautiful. It is found to be the case frequently that the relative length varies in the two feet. While the great toe is the longer in the majority of mankind, the case seems to be reversed in the mongoloid and negro races.

— The Russian government has summoned the principal ironmasters and manufacturers of the Ural and middle Russian districts to attend a conference at St. Petersburg, at which delegates of the various industries will be present, in order to discuss the steps that should be taken to improve the iron industry of Russia. Since 1874 the production of pig iron has not increased, and in some years has decreased. Instead of being, as Russia once was, one of the leading iron-producing countries, Austria produces twice as much, France nearly four times, Germany five times, and England, once an importer of Russian iron, now produces ten times as much. The *Moscow Gazette* ascribes this to an antiquated system of commerce, onerous railway rates, and insufficient protection on the part of the tariff.

— A large falling-off in the immigration is reported by the chief of the bureau of statistics. The number arrived during the year was 395,346, as against 518,592 during the preceding year, and a falling-off of fifty per cent since 1882, when the arrivals were 788,902.

WASHINGTON LETTER.

THE department of agriculture is showing a renewed interest in the sorghum and sugar industries of the country. Professor Wiley, the chemist of the department, has sailed for Europe, where he will spend as much time as is necessary in the investigation of the present condition of these industries in various countries, and a study of the latest improvements in machinery and methods. The results likely to arise out of Professor Wiley's visit will doubtless be of considerable importance as enabling the department to contribute to the success of the experiments that are being made in the United States.

Much interest is just now exhibited in scientific circles in experimental seismology. The rooms of the Philosophical society were crowded at its last meeting, the principal topic being the discussion of the observations made at the time of the Flood Rock explosion. Although perplexing, and to some extent inconsistent, the results promise to be of considerable value. Captain Dutton, in whose hands this subject is placed by the director of the geological survey, proposes to take advantage of dynamite explosions, which are frequently occurring in the excavation of a tunnel near the city, to continue the investigation of the question of the velocity of transmission of the disturbance, and it is earnestly desired that he may be allowed all needed facilities.

It is reported that Baba Gopal Vinayak Joshee, a Brahman pundit, and fellow of the Theosophical society of Bombay, is the guest of Dr. Elliott Coues of this city. An enterprising reporter for one of the city papers has interviewed both the distinguished theosophist and his host, no less distinguished in that line, and, if they are correctly reported, has been made the medium for the transmission of information of the most vital importance to an expectant and anxious public.

All the 'working processes' of this wonderful philosophy were concealed from the newspaper man, however, and for two reasons, which, in his calmer moments, he cannot but regard as somewhat personal. One was that "this knowledge in the hands of bad men would be a terrible thing;" the other, that "a mind not yet cultivated to follow out this high train of thought might be driven insane by it."

A good deal was said about 'astral visits' and that sort of thing, and experiments and results were recounted, in comparison with which the work of the Society for psychical research, with its cards and its guessed numbers, appears absolutely childish; in fact, it must be relegated to the stone age.

Preparations are being made for the meeting of the American public health association, to be held in this city early in next month (Dec. 8-11). A strong local committee has been appointed, including, among others, several leading physicians of the army and navy. The meeting is likely to bring together a large number of the leading sanitarians of the country. The association is but little more than ten years old, but it is one of the most active and influential in the world. Z.

Washington, D.C., Nov. 16.

LETTERS TO THE EDITOR.

. Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The swindling geologist.

PROFESSOR SALISBURY'S letter in *Science* for Nov. 6 gives the present location of a miscreant who has been plundering cabinets and libraries throughout the country for the last two or three years, and who has been making decent people even more unhappy by assuming their names than by stealing their books. His present address is County Jail, Elkhorn, Wis. *Esto perpetua*. This is the address; but as to the name, who knows? For the last six months he has dragged through the mire the honored name of Leo Lesquereux, to the great annoyance of the venerable owner. Before this he was Prof. F. A. Arendel of the Pennsylvania survey. Other names under which he has stolen and swindled are N. U. Taggart, E. Douglass, E. D. Whitney, E. D. Strong, etc. Three of these names have the initials E. D., in which fact there may be some significance.

The Milwaukee police record says of him that he has but one hand, wearing a false hand on one arm. This fact may help to identify him. He seems to have a remarkable amount of geological knowledge, and especially on fossil botany. Where did he get this knowledge? Who trained him? Who was his father? Who was his mother? Has he a sister? Has he a brother?

These are questions that many victims desire to have answered, in whole or in part. E. O.

Columbus, O., Nov. 9.

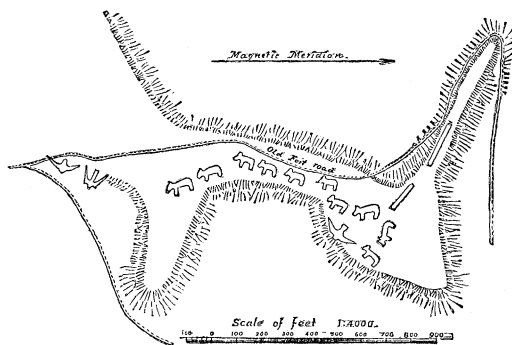
Effigy mounds in Iowa.

Near the village of North McGregor, Clayton county, Iowa, on the south-western quarter of section 3, T. 95, R. 3 W., is situated probably the largest group of 'effigy' or imitative mounds west of the Mississippi. These earthworks are built on a dividing ridge, and are elevated about 500 feet above the river. The surrounding country is broken and rugged, the bluff on the east side along the Mississippi River being perpendicular in many places. To the north-west lies Yellow River, and on the south-west Bloody Run. This remarkably fine group was surveyed by me on the 25th and 26th of May, 1885; and a few details, illustrated by a topographical plan, may perhaps be acceptable to those readers of *Science* who are interested in North American antiquities.

These mounds number fifteen in all, consisting of two long embankments, ten animals, and three birds, and they occupy a *terre-plein* of just about 2,000 feet in length. The first embankment is 190 feet long, 18

feet wide, and $1\frac{1}{2}$ feet high; the second, 138 feet long, 18 feet wide, and $1\frac{1}{2}$ feet high.

The animals represented vary from 79 to 109 feet in length, and are from two to three feet in height. No two are exactly alike in outline, though the difference is more in the shape of the head than in the general form. It will be noticed that they are all tailless, though, of the whole number of beasts surveyed by me to the present time, fully two-thirds have tails. Considered as works of construction,



they being in relief, these animals are very fine; but, taking the size and shape of the legs and head in proportion to the body, they are decidedly clumsy. Indeed, with a few exceptions, the animal-shaped mounds of western Wisconsin, also, are no exception to this rule. It is probable that each leg, as built, was intended to represent a pair of legs rather than a single one, and this may account for their clumsiness.

The birds of this group are each different in form, and are more symmetrical than the animals, which is usually the case. Though symmetrical, the wings of bird effigies are nearly always much longer than they should be in proportion to the length of the body and head as compared with natural birds.

An ornithological friend (Dr. Thomas S. Roberts of Minneapolis) has furnished me a list showing the actual length—from point of bill to the end of longest tail-feather—and breadth, from tip to tip of wings, fully outstretched, of some forty-six North American birds. Taking this length as the unit, I find the proportions of four of them to be as follows; viz,—

Of the Magpie (the lowest).....	1 : 1.28
“ Wild turkey.....	1 : 1.29
“ Bald eagle.....	1 : 2.365
“ Fish-hawk (the highest)....	1 : 2.80

Now, on examining the diagrams of forty-three undoubted bird-effigies surveyed by myself, it appears that fifteen are over the extreme natural limit given above—the ratio of one of them being as high as 1 : 7.20, and that of the very lowest not less than 1 : 1.50. The actual size of this longest ‘bird’ is, length of body, 77 feet; and from tip to tip of wings, 554 feet.

It will thus be seen that to classify these earthen imitations of birds according to any natural system is almost an impossibility, and, with a few exceptions, it is the same with the effigies of animals, reptiles, etc. An instance may be given of one near Viola, Wisconsin, which looks more like a deer than any other animal. Its head is turned as if looking over

its back, but the tail spoils the whole effect, on that supposition; it being 140 feet in length, nearly twice the length of the body (74 feet).

There are effigies undoubtedly representing turtles and lizards; there is also a class to which either name can be applied. The question is, To which category do they belong?

In view of all these facts, therefore, it would appear that attempts to speculate about the object or uses for which these fantastic earthworks were constructed, or concerning the precise kind of animal, etc., represented by the effigies, might be considered, in the present state of our knowledge of the subject, a little premature. As matters of fact, however, it may be stated that an examination of some hundreds of these mounds justifies the drawing of two conclusions, first, that the creatures point or head, with a very few exceptions, in a southerly direction; second, that when situated near a stream the feet of the quadrupeds are towards the water.

At intervals, between Guttenberg and Yellow River, there are mounds and embankments which occur either singly or in groups, but there are only two other points in that stretch where effigies occur. About one mile south and east of the group described in this article there is a single bird-effigy. Near Sny McGill, about three miles above Clayton, there is a group of 92 mounds; two of them represent animals, and two birds; the remainder are round mounds and embankments. While I was surveying this group, Mr. Frank Hodges of Clayton opened one of the larger tumuli, and found a number of skeletons in it.

T. H. LEWIS.

St. Paul, Minn., Nov. 2.

Coleoptera of America.

The note in *Science* (vi., 382) conveys a very erroneous idea as to the result of recent studies upon the number of species of North American beetles.

The number given in Austin's supplement is 9,735 (not 9,704, as stated in *Science*); but as the supplement was to be used in connection with Crotch's list, it was numbered continuously with it, and no allowance was made for the reduction and duplication of numbers. Taking these into consideration, the supplement contains but little over 8,850 species.

The list just issued by the American entomological society contains over 260 unnumbered names which should be added to the 9,238 when this list is compared with previous ones. Recent studies have increased, not reduced, the number of species of North American beetles.

SAMUEL HENSHAW.

Boston, Nov. 7.

Marsh's Dinocerata.

In my review of Professor Marsh's work on the Dinocerata occurs a blunder for which I wish to apologize (*Science*, June 12, 1885, p. 489). This error is as follows: “In the figure of Dinoceras, however, the humerus is incorrectly drawn (compare plate 28, fig. 2).” The figure here referred to is the humerus from the *inside*, that in the restoration is of course seen from the *outside*, and the two are in no sense comparable. I cannot explain how such an oversight came to be made, but now that my attention has been called to it, it is only proper to make the correction. This is, however, a very non-essential part of my criticism, which in other respects I do not wish to modify.

THE REVIEWER.

Recent Proceedings of Societies.

Academy of natural sciences, Philadelphia.

Nov. 10. — Dr. Harrison Allen called attention to the results of his examination of the inferior limbs of animals, made with a view of determining the relation of the shape of the leg to the sustained weight. Certain features occurring in common and in contrast in the limbs of man and the lower animals were illustrated by specimens. Such forms as the sloth, the bat, and the seal were of special interest, as they place no weight at all on the posterior extremities, and it was found that these have features in common, depending on this fact. The neck of the femur is shortened, the shaft flattened, and the astragalus lengthened. The direction of the condyles of the femur, and the extent to which they are thrown back, also have constant relation to the weight supported. The same may be said of the shape of the astragalus; this bone in heavy animals being flat, while in those in which the inferior limbs are relieved somewhat from the weight of the body it is elongated. The calcaneum is modified proportionately. Incidentally it was remarked, that, in the case of an Indian skeleton found at Cooper's Point, the outer side of the astragalus is prolonged so as to articulate in a more pronounced way than usual with the end of the fibula, thus approaching the condition in the gorilla. In continuation, Dr. Allen considered the effect produced on suspended animals by the extending instead of the compressing influence of their position. — Professor Heilprin, referring to a former communication on fossils from the ferruginous sand of the coal-regions near Wilkesbarre, stated that a second lot had been received recently which contained a considerable number of distinct types. These prove even more conclusively than was at first supposed that the geological horizon indicated by them is the upper carboniferous, and not the Permian, as had been asserted. The presence of the remains of two species of trilobites places this beyond doubt, as these animals are not said to have been found above the carboniferous anywhere except in a certain locality in the Sierra Madre; and the determination of even this horizon is open to grave question. As far as the evidence to be drawn from animal remains is concerned, it may be asserted with safety that the Permian formation is not represented in the eastern United States. A list of the species and genera forming the collection, as far as they had been determined, was given. — Dr. Leidy referred to a recent observation of Mr. Holman on the reproduction of amoebae. While studying one under the microscope, it suddenly burst and disappeared. The slide was afterwards found swarming with small forms, which were probably developed from the spores or molecules of the larger individual. The same observation had been made previously by the speaker. As the amoebae usually multiply by division, this would indicate a second mode of reproduction.

Torrey botanical club, New York

Nov. 10. — Dr. Britton read a paper upon *Quercus Muhlenbergii*, Engelm., and *Q. prinoides*, Willd. The former was originally described by Muhlenberg as *Q. castanea*, and by Michaux as *Q. Prinus*, var. *acuminata*. By other authors it is generally regarded as

a variety of *Q. Prinus*. That it is distinct from the common chestnut oak of our eastern states, all are at present agreed, but its relation to *Q. prinoides*, Willd., is more obscure. This latter was formerly regarded as a variety of *Q. Prinus*, under the name *Q. Prinus*, var. *humilis*, Marshall, but it is now considered a distinct species under the name of *Q. prinoides*, Willd. That it is more nearly allied to *Q. Muhlenbergii* than to *Q. Prinus* is, however, seen by its nearly or quite sessile thin cup and small globose acorn. Professor Sargent considers them as one species, *Q. Muhlenbergii* being the large western form, and *Q. prinoides* the small eastern form. The typical *Q. Muhlenbergii* is known at five widely separated localities in Pennsylvania, all on limestone soil, however, and also upon the white crystalline limestone of Stirling Hill, Sussex county, N.J., and the lower Silurian limestone below Phillipsburg. It has also been observed in the low sandy soil in the vicinity of Bridgeton. The *Q. prinoides* is, however, widely and plentifully distributed throughout southern and south-eastern New Jersey, where it is seldom more than four feet high, and fruits at six inches from the ground. On the mountains in the northern part of the state it occurs less abundantly, but somewhat larger, reaching a height of eight or ten feet. It has a wide range in Pennsylvania, is found on Long and Staten Islands, and extends northward along the coast to Massachusetts. Dr. Britton said, All of the numerous specimens which I have examined show a remarkable persistence of leaf and fruit characters, and if I were not assured, on the very highest authority, that the low, bushy form passes gradually into the tree in the west, I should not be at all inclined to regard them as the same species. However, as this appears to be the case, I hold that our eastern shrubby form is at least a well-marked variety of Dr. Engelmann's species, and propose for it the name *Quercus Muhlenbergii*, Engelm., var. *humilis*, N. L. B. — Dr. Newberry gave an account of the fossil flora now being unearthed from the cretaceous clays of New Jersey, and compared the species with similar forms from the clays of Greenland and Aachen. Within the past two or three months a most surprising number of species have been brought to light, — perhaps one hundred and fifty distinct ones, which are being figured as rapidly as possible. They include some fifteen conifers, ten or twelve ferns, two or three cycads, and several specimens of what is undoubtedly a large composite flower. The remainder are deciduous trees and shrubs, many representing present living genera.

Calendar of Societies.

Cambridge entomological club.

Nov. 13. — R. Hayward, Some western coleoptera selected from the results of his summer's collecting; George Dimmock, Some varieties of Coccinellidae produced by breeding.

Biological society, Washington.

Nov. 14. — Richard Rathbun, Remarks on the Wood's Holl station of the U. S. fish commission; W. S. Barnard, Specimen mounting case and method; John A. Ryder, A new and practical system of raising oysters on a large scale; Frederick True, On a spotted dolphin apparently identical with the *Prodelphinus doris* of Gray.

Boston society of natural history.

Nov. 18. — J. W. Fewkes, The general results of his study of the deep-sea Medusae of the Albatross; G. L. Goodale, The influence of forests upon the atmosphere.

Engineers' club, St. Louis.

Nov. 4. — C. W. Clark, Notes on the influence of inclination of the limb and of the axis of a theodolite on the measurement of horizontal angles.

Natural history society, Agricultural college, Mich.

Nov. 13. — L. H. Dewey, The bladderwort; W. E. Gammon, Our autumn birds; McLouth, The classification of knowledge; C. P. Gillette, The cherry tortrix; G. W. Park, External structure of the crab.

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SCIENCE.—SUPPLEMENT.

FRIDAY, NOVEMBER 20, 1885.

RECENT LAND LEGISLATION IN ENGLAND.

THE attitude of the English government toward the land question has undergone a thorough revolution within the last generation. Thirty years ago all propositions to reform the abuses which had grown up under the present system of land laws were uniformly met by loud protests about the sacredness of vested interests, the 'naturalness' of the existing order, and the danger to society and the government of disturbing it in any way whatever. It was insisted that it would be a violation of all sound principles of political economy for the government to go beyond its province so far as to interfere with the relation of landlord and tenant, or that of tenant and laborer, or that existing between these classes as a whole and the public. So vigorous was this protest, and so in accordance with the prevailing views as to the true sphere of government interference, that reformers were usually content to withdraw their propositions.

But this attempt to delay or prevent much-needed reforms in governmental policy was destined to bring with it the usual penalty. The disease, which might have been modified, if not entirely cured, by mild remedies rightly applied at an early stage, became more and more deep-seated and serious with every passing year. The movement for reform, too long delayed, and gathering force with every rebuff, has finally proved irresistible, and in its onward sweep has carried the government and the people far beyond what would have been necessary if legitimate demands had been satisfied in the first place.

The evidence of this is seen very plainly in the changed attitude and policy of the government, which has recently given most* unmistakable evidence of its determination to take up the question in earnest, and to leave no stone unturned in order to secure a permanent settlement. In this endeavor, limited thus far chiefly to one phase of the Irish land question, it does not propose to be checked by any theoretical considerations as to the true limits of government interference. It stands ready to do any thing which promises to afford permanent or even temporary relief. If necessary, it will declare martial law. It will

confiscate landed estates by the wholesale. It will change a tenant at the will of the landlord into a tenant at his own will. It will convert a tenant into a proprietor. It will lend money, to those wishing to buy land, at low rates of interest and on insufficient security. It will destroy all freedom of contract in regard to the use of land. It has, indeed, already done all these things.

The proof of these statements is to be found in the history of recent acts of parliament on the land question.¹ It is impossible to convey a clear idea of such a complicated problem as the Irish land question in a brief space, but one or two of the most important points may be set forth which will illustrate the far-reaching sweep of recent legislation.

The act which really introduced the new policy was that of 1870, which declared whole classes of contracts hitherto in vogue between landlord and tenant to be void both in law and equity, and established the novel principle of compensation for disturbance or damages for eviction. It took from the landlord the right to dismiss a tenant so long as he paid his rent. It secured to the latter a just compensation for all improvements, whether made with or without the consent of the landlord, and conferred on him the power to sell his tenant-right, with all the privileges pertaining thereto. This act was in form, therefore, a great encroachment on the control of the landlord over his property. But as it did not regulate the amount of rent which the latter might exact, it left him, after all, in practical control of his property, since he might raise the rent at will, and evict the tenant if he did not choose to pay it. It rather aggravated than lessened the difficulty.

The act of 1881, which was the most important act relating to Ireland, was the logical outcome of the act of 1870. It finished the work which the latter had begun by establishing a series of optional courts for regulating rents. They are optional in the sense that either landlord or tenant may resort to them in case he is not contented with the terms of a lease. The court, in case of a resort to it, fixes the rent which the landlord may exact. When the rent is thus judicially fixed, it is to hold good for a period of fifteen years, when, by a similar process, it may be modified to suit altered circumstances during another period of like duration. As long as the tenant pays the rent

¹ *Economic aspect of recent legislation.* By WILLIAM WATT. London, Longmans, Green, & Co., 1885.

thus fixed, he cannot be disturbed in possession by the landlord, except on the payment of a fine known as 'compensation for disturbance.' The tenant may sell his tenant-right to another, who has then all the privileges as against the landlord which the original tenant enjoyed. In this way are secured the three 'F's,'—Fair rents, Fixity of tenure, and Free sale. In this way, also, the landlord is almost completely deprived of any real control of his property.

The act has not been, by any means, a dead letter. Eighty-five sub-commissioners were, in 1883, engaged in the work of determining 'fair rents,' and the number was afterwards somewhat increased. As a result a general reduction in rent was effected, amounting on the average to about twenty per cent, and in some cases to thirty per cent and upwards. This virtually amounts to a confiscation of from one-fifth to one-third of the capitalized value of landed estates in Ireland. Its moral effect may lead to a still further reduction in value: for who can be sure that a government which has confiscated one-fifth of the estate will not subsequently confiscate it all if peace and quietness not follow as a result of the present measure?

Both acts above mentioned contained provisions intended to favor the growth of a class of peasant proprietors. The purchase of holdings by tenants in the case of estates which fell under the jurisdiction of the encumbered estates court, was favored by the authority given to the Irish board of works, in 1870, to advance two-thirds (increased in 1881 to three-fourths) of the purchase-money at three and a half per cent interest, to be repaid at intervals during a period of thirty-five years. It has already been proposed to extend this authority so as to let them advance all the purchase-money at a lower rate of interest, for a longer time.

He would be a bold man indeed who would assert that these acts, sweeping as they are, constitute any real contribution to the actual solution of the Irish problem. Such a statement could only be made by one who had a political point to gain, or who had given but little attention to the actual investigation, even at second hand, of the social and economic conditions which prevail over a large part of Ireland. The difficulty lies deeper than any mere landlordism, and it will not be long until the Irish land question will be again to the front, and that, too, whether Ireland be under English or Irish rule.

These acts, however, mark a new era in English legislation on this subject. They indicate (and herein lies the hopeful feature of the case) that the English people are now ready to take up this and similar questions in earnest. They are now

willing to throw to the winds all doctrinaire theories of *laissez-faireism*, to disregard alarmist speeches about approaching communism or socialism, and to close their ears to the old song about the supreme sacredness of private property. They are now determined, after getting all the light they possibly can from economic and historical science, to make use of the only means which promises any solution whatever, viz., that of actual experimentation. The outcome of the recent experiments in Ireland, to which the late acts have been practically limited, will afford great assistance in the solution of the Scottish and English land questions, which must soon come to the front.

E. J. JAMES.

THE BLACKFOOT TRIBES.

At the late meeting of the British association for the advancement of science, a committee of the anthropological section presented a report (prepared by Mr. Horatio Hale) on the tribes of the noted Blackfoot confederacy. The report comprises many particulars relating to the origin and history of the tribes, the character of the people, their mythology, languages, and mode of government, and their present condition. The facts have been mostly derived from correspondence with missionaries now residing among the people, and from official documents, with some memoranda made by the author of the report during an exploring tour in Oregon. Only a brief abstract of the information thus brought together can here be given.

The tribes composing the confederacy are, or rather were, five in number. Three of these, forming the nucleus of the whole body, are the original Blackfoot tribes, who speak the same language, and regard themselves as descended from three brothers. These are the Siksika, or Blackfeet proper; the Kena, or Blood Indians; and the Piekané, or Piegans (pronounced Peegans),—a name which is sometimes corrupted to 'Pagan Indians.' To these were added, when the confederacy was at the height of its power, two other tribes,—the Sarcees, who joined them from the north; and the Atsinas, who came under their protection from the south. The Sarcees are a branch of the great Athabascan or Tinneh family, which is spread over the northern portion of the continent, in contact with the Eskimo. The Atsinas, otherwise known as Fall Indians and Gros Ventres, are shown by their language to be akin to the Arapohoes, who once wandered over the Missouri plains, but are now settled on a reservation in the Indian Territory.

The dividing line between the United States and

Canada has cut the confederacy in two. Most of the Piegiens, with the few surviving Atsinas, reside on the American side, where a large reservation has been set apart for them, along the head waters of the Missouri River. The residue of the Piegiens, with the Siksika, Kena, and Sarcee bands, dwell on reserves laid off for them near the southern boundary of the Canadian north-west territories, adjacent to the Rocky Mountains. Thus the lands occupied by these tribes, though much diminished in extent, are in the same region which they held fifty years ago, when their confederacy was the dominant power among all the Indians west of the Mississippi. At that period their numbers were reckoned at thirty thousand souls. Various causes, but more especially the ravages of the small-pox, have greatly reduced them. The population of the four Canadian reserves is computed at about 6,500, divided as follows: Blackfeet (Siksika), 2,400; Bloods (Kena), 2,800; Piegiens (Piekanè), 800; Sarcees, 500. On the American reservation there are stated to be about 2,300, mostly Piegiens, with some Sarcees. This would bring up the total number of Indians in these tribes to nearly 9,000 souls.

The country inhabited by the Blackfeet was the favorite resort of the buffalo. The vast herds which roamed the plains, or found shelter during the winter in the woody recesses of the mountains, furnished the tribes not merely with food, but with the skins which made their tents and their clothing. The complete extermination of these animals, which has taken place during the last five years, has made an entire change in the mode of life of these Indians. From a race of wandering hunters, they have become a community of farmers, and, as the official reports show, have displayed a remarkable aptitude for the arts of civilized life. Under the direction of superintendents and farm instructors appointed by the Canadian government, they have erected comfortable log-houses, well furnished with cooking-stoves, table-ware, and other household appliances, and have raised large quantities of potatoes, barley, oats, turnips, and other esculents. They have shown themselves always orderly and prudent in their dealings with the government and the white settlers.

The Blackfoot language was formerly supposed to be entirely different from any of the languages spoken by the surrounding tribes. This was the report of the first explorers. Further investigations have shown that this opinion was not well founded. The language proves to be Algonkin in its grammar, but to be in a large part of its vocabulary widely different from other Algonkin tongues. It is evidently a mixed language, of the

kind which results from the conquest of one tribe or nation by another speaking a different tongue. What is known of the history of the Blackfeet shows how this conquest and intermixture may have taken place. The Blackfoot tribes formerly inhabited the Red River country, from which, as there is good reason to believe, they were driven westward by the Crees, who formerly dwelt in Labrador and about Hudson Bay, but who now occupy the ancient homes of the Blackfeet along the Red River and the Saskatchewan. The Blackfeet, when they retreated to their final refuge in the valleys and plains along the eastern slope of the Rocky Mountains, had in their turn to overcome and absorb the population which they found there. The traditions of the people, and other circumstances, seem to show that the tribe thus conquered—and whose language probably furnished the foreign portion of the Blackfoot vocabulary—had come from the west or Oregon side of the mountains.

In further confirmation of this view, it is shown that the Blackfeet have not only a mixed language, but also a mixed religion. While their legendary cosmogony and their principal deities are purely Algonkin, their chief religious ceremony, the famous sun-dance, to which they are fanatically devoted,—the most extraordinary trial of faith and of endurance known among the western Indians,—is clearly of exotic origin. It is wholly unknown to the other Algonkin tribes, except to a few Crees, who have apparently learned it from the Blackfeet. It also prevails among the Dakotas, but chiefly in the western bands nearest to the mountains and to the Blackfeet.

The form of government among the Blackfoot tribes, as among the Algonkin tribes in general, is very simple. Each tribe has a head chief, and each of the bands composing a tribe has its subordinate chief; but the authority of these chiefs is little more than nominal. Their prerogatives are chiefly those of directing the movements of a camp, of presiding in council, and of representing the tribe or band in conferences with other communities. The term 'confederacy,' applied to the union of the Blackfoot tribes, is somewhat misleading. They have no proper inter-tribal league, like that of the Iroquois nations. There is simply a good understanding among them, arising partly from the bond of kinship, and partly from a sense of mutual dependence. Even the three proper Blackfoot tribes can hardly be said to have a general name for their whole community, though they sometimes speak of themselves as *Sawketakia*, or 'men of the plains,' and occasionally as *Netsepoyè*, or 'people who speak one language.'

The foregoing, as has been stated, is only a brief summary of the contents of this report, which is given in an abridged form in *Nature*, and will doubtless hereafter be published in full by the association. The facts which it presents disclose in the people of this aboriginal Switzerland qualities much above the average, and should lead to further inquiry into their history and characteristics.

SOME REACTION-TIME STUDIES.

THE study of reaction times derives a great interest and importance from the fact that by this means another bond of relation between mind and matter becomes apparent. All material actions require time. Mental actions as well, from the perception of a sensation to the highest expression of the intellect that offers itself to experimental investigation, also occupy an appreciable amount of time. This mental time is not constant as the time of a falling body in space, but is affected by slight variations in bodily and mental conditions.

M. Beaunis¹ has studied the effect of one important mental requisite, namely, expectation. The reactions were made to a visual sensation, and 36 persons besides himself (most of whom were medical students) were experimented upon. A signal (*advertisement*) was given, whereupon the subject held himself in readiness for the flash of light, so as to react by pressing the key as quickly as possible. The time between the signal and the flash of light is the *expectation time*; that between the light and the seeing of it, the *reaction time*. The expectation time was varied from .3 sec. to 3 sec., and the following conclusions were reached:—

(1) As others had already shown, the reaction time is shorter if a signal is given than if it is not.

(2) The *longer* the expectation time, the *shorter* the reaction time. The experiment may be compared to the problem of finding an object in a dark room by bringing the light of a bull's-eye lantern upon it. When there is no signal, that is, when directed to find the object without time to get the lantern ready, it would evidently take longer to find the object than it would if time were given to get the lantern in position; and the longer this time, the quicker would the object be found. The attention acts as the bull's-eye lantern.

(3) The difference between the minimum and maximum times is greater than when a signal is not given, and increases as the expectation time increases.

(4) The influence of several individual differences, etc., was evident. In two of the medical

students the reactions were always slow. In many it was very quick. M. Beaunis was the only person who was accustomed to this kind of experimentation, and in his case a much smaller percentage of experiments had to be thrown out as faulty than in the others. The effect of health was marked in one case. Feeling slightly indisposed in the morning, M. Beaunis's reaction time was .37 sec., *i.e.*, abnormally slow. In the afternoon it was .222 sec., showing that the normal condition was returning. Two hours later it was normal (.160 sec.).

An extremely interesting research is that of Guiccardi and Ranzi,² in which they compare the reaction time to a sound impression in normal persons with the same in patients suffering from auditory hallucinations. The reaction time is obtained somewhat in this way. The making of the sound which serves as the stimulus sets into motion a chronoscope, which the subject stops, as soon as the sound is heard, by pressing an electric key. In this way the following table, giving in seconds the time necessary for hearing the sound, was prepared:—

	Normal.	Hallucinated.
Average of 10 shortest reactions out of 50	.1012	.0947
Average variation	.0033	.0046
Average of remaining 40 reactions	.1259	.1403
Average variation	.0132	.0206
Average of all 50 reactions	.1135	.1175
Minimum time	.0885	.0802
Maximum time	.1731	.2287

Taking the mean of the 10 shortest reactions, or comparing the minimum reaction time, we see that those suffering from hallucination are quicker in their perception of sound; and this difference must be ascribed to morbid irritability of these centres of apperception. On the other hand, the other averages, and especially the average divergence from the mean reaction time, *i.e.*, the average variation, and the maximum time, show that normal persons can command a steadiness and regularity of the attention, which is impossible in those afflicted with sound hallucinations.

In many cases the reaction time is and must be studied under rather artificial conditions. This circumstance is apt to weaken inferences drawn from such studies to similar processes in normal mental activity. In a recent study² of the time necessary for recognizing letters, numbers, colors, etc., this difficulty has been successfully overcome. Small letters were fastened to a revolving drum, and looked at through a slit of variable width in a screen held before the letters. The letters are

¹ *Revue philosophique*, September, 1885.

² "Ueber die zeit der erkennung und benennung von schriftzeichen, bildern und farben," by J. M. Cottell. *Philosophische studien* (Wundt), vol. ii., No. 4. Leipzig, 1885. The work was done in the psychophysical laboratory of Johns Hopkins university.

¹ *Revue philosophique*, September, 1885.

adjusted at such distances that, with a slit 1 cm. wide, one letter is always in sight; if 2 cm. wide, two letters; and so on. By varying the rate of rotation of the drum and the width of the slit, the time necessary for the reading of a single letter under various circumstances was obtained. Up to a certain limit, this time is *shortened* as the slit is *widened*. This fact is to be interpreted as follows: In reading these letters, two time elements are involved: 1°, that of recognizing the letter; and, 2°, that of naming it. The association between the sight of the letter and its name is so close, that the latter action is performed automatically: hence, if the letters follow one another with so great a rapidity that the first can be named while the second is being recognized, the average time for reading a single letter will evidently be shortened; and the experiments show that this power of carrying over one letter while pronouncing the preceding can be active when three, or in the case of several persons when four or five, letters were present to the eye at once.

Another series of experiments showed that it takes longer to count letters than to name them; and if the letters are counted in groups of two, or better still of three, instead of singly, the counting time is reduced.

The time necessary for reading words in different languages was also studied; and the general result is, that the maximum rapidity with which words forming sentences can be read varies directly with one's acquaintance with the language. A German read 100 German words in 18.4 sec., but 100 English words in 29.1 sec. This method offers a means of objectively testing a person's acquaintance with a foreign language. If the words are read backwards (thus eliminating the sense of the passage, and reducing the process to mere reading), the time is lengthened; but the smaller one's acquaintance with the language, the less difference in time between reading it forwards and backwards.

It seems that among those tested, women read faster than men; and Germans take longer to spell their words than English-speaking persons.

If small strips of colors are used, instead of letters, it takes almost twice as long to name the true color as it would to name a letter; and this difference in time is due to the greater difficulty in finding the proper name. In this case the association between the color and its name is a loose one. These studies will be continued in the next number of the *Studien*. J. J.

NEXT year's exhibition at South Kensington, of the products of India and the colonies, is to be the last of the sort in that locality. Liverpool is to have an exhibition of shipping and means of transport.

THE LAWS OF TEMPERATURE IN THE AUSTRIAN ALPS.

DR. JULIUS HANN of Vienna, editor of the Austrian meteorological journal and a leader among European meteorologists, has lately completed his detailed studies on 'Die temperaturverhältnisse der oesterreichischen alpenländer,' which are now published in three parts in the *Sitzungsberichte* of the Vienna academy of sciences. All available observations are included in the reductions, and the results are stated with great detail. As to method, attention should be emphatically called to the reduction to normal means; that is, to the mean of some definite series of years, in this case the thirty years from 1851 to 1880: thus, if a station had records from 1855 to 1884, the mean of these thirty years' observations was reduced to what it most probably would be for 1851-1880 by the use of a correction determined from neighboring stations where the records covered both periods; that is, from 1850 to 1884. Wild of Russia, and Buchan of Scotland, have employed this method for low-level stations; Hann is the first to show its applicability to mountain stations also. As to results, one of the most striking is the appearance of the *increase* of temperature upwards in the thirty years' winter mean of valley and mountain stations as a persistent climatic element. Observations of late years have shown that this inversion of temperature — extreme cold in valleys with moderate cold on mountains — was common enough in the winter during anticyclonic or high-pressure weather, but it is here first shown to be a persistent inversion characteristic of the winter mean. Hann was also the first to explain, several years ago, the peculiarities of the warm winter alpine wind known as the *föhn*, which depends directly on the unduly high temperature of the upper air in winter.

BEN NEVIS METEOROLOGICAL OBSERVATORY.

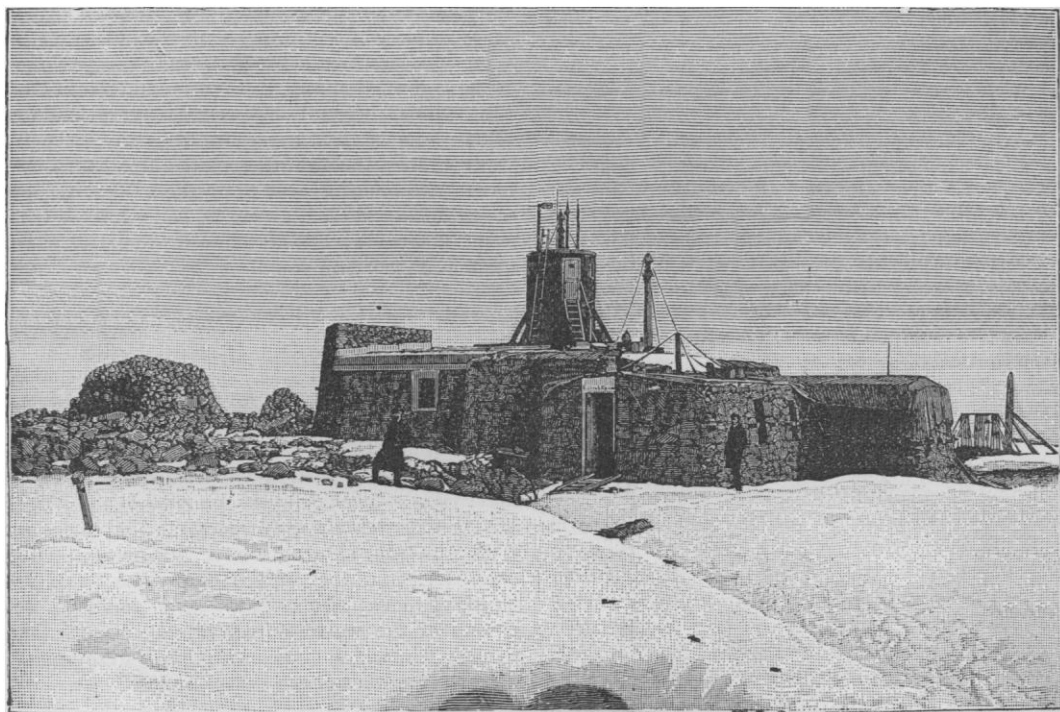
THE highest of the Scotch mountains, Ben Nevis, reaches an altitude of four thousand four hundred feet; less than five miles away, the sea stretches a long arm up the submerged portion of the great glen to Fort William. On this well-chosen summit, in the path of many a storm from the Atlantic, the Scottish meteorological society has built an observatory, here figured, for the direct study of the conditions of the upper air, which observations at their low-lying stations must leave to inference. Most of the few mountain observatories of Europe stand at a greater height than the summit of the Ben, but none of

them have the peculiarity of being immediately by the sea, and none are so frequently visited by storms. Hourly observations of the usual meteorological elements are taken by Mr. Omond, the superintendent, and his two assistants; and, if the observatory be maintained as well as it has been begun, its records must yield results of the greatest value in the study of the weather. Unfortunately, its support still depends only on general subscription. Among the generalizations thus far made for Ben Nevis by Mr. Buchan, secretary of the Scottish society, we may quote the following:

are prevailingly cold, on account of the rapid loss of heat by radiation from the ground through the clear, dry air. Mountains, therefore, have a meteorology of their own, and one that is well worth studying.

THE ORIGIN OF MEDIAEVAL UNIVERSITIES.

AN important contribution to the history of higher education has been made in Germany by the publication of a work¹ on 'The mediaeval uni-



BEN NEVIS METEOROLOGICAL OBSERVATORY. (*London graphic.*)

The mean velocity of the wind is greater at night than at day, this being the reverse of the variation found at low-level stations, but in accordance with the results of other mountain observatories and with theoretical deductions; diurnal variations of temperature are small, the change from warm to cold weather being very largely dependent on the passage of cyclonic storms; the temperature is abnormally high during the passage of an anticyclone, or area of high atmospheric pressure, in which the air descends from great altitudes, and is warmed by compression; this, like the variation of the wind, being the reverse of what obtains at lower levels, where anticyclones

versities prior to 1400.' Its author is *unterarchivar* of the papal see, P. Heinrich Denifle, and he has brought the thorough methods of research which are characteristic of the Germans to the discussion of the ample stores of information which are to be found in the archives of Rome, Florence, Paris, Leipzig, Munich, Erlangen, and other ancient seats of learning. The volume before us includes more than eight hundred pages, but it is only one-third of the proposed work. It discusses the origin of the universities in the middle ages; and their organization and constitution are to be considered

Die universitäten des mittelalters bis 1400. Von P. HEINRICH DENIFLE. Band I. Berlin, Weidmann, 1885.

in the second part, and in the third many subordinate subjects. Our space will not allow us to do justice to the erudition of this great work, but we can, perhaps, exhibit its scope so that those who are interested in the circumstances which gave birth to the progenitors of our modern institutions may understand how rich a storehouse of learning has been provided for them.

The writer begins with the study of the now venerable words, *studium generale* and *universitas*. Both terms were in vogue as early as 1300. The former phrase has not been found in use as the name of a high school prior to 1233-34, when it is applied to the school of Vercelli: the phrase *studium universale* is a little older. *Universitas* (as other writers, following Du Cange or the lexicographers, have pointed out) had originally no special reference to a seat of learning. It signified very nearly what we call a corporation, and was almost synonymous with such words as *societas*, *collegium*, *corpus*, *communio*, *consortium*. Gradually it came to be employed for the corporation devoted to the pursuit of knowledge, and then was restricted to this use, so that *universitas oxoniensis* was interchangeable with *studium oxoniense*; but the proper designation of a mediaeval high school was *studium generale*, or *studium* alone. As early as 1254, the word 'university' is used in Paris as equivalent to 'college.' The definition of Hugolinus is worth quoting: 'Universitas est plurium corporum collectio inter se distantium uno nomine specialiter eis deputato.'

From this preliminary inquiry, the writer proceeds to the history of the universities of Paris and Bologna, which, in his view, require more elaborate treatment than the other high schools, not only because of their extraordinary direct influence, but because their constitution is the key to that of many later foundations. The school at Salerno, older than the two just named, was quite subordinate in general influence. Savigny's theory that universities, by a sort of natural evolution, were developed around the chair of an illustrious teacher, is vigorously opposed by Denifle, who recognizes many factors as co-working in the origin of an enduring university. New methods of instruction, and privileges accorded by authority, seem to our author most potent influences; but even more important was the forming of corporations for the promotion of study, or, in other words, the introduction of combined or co-operative methods of instruction. The different modes in which such combinations were secured in Paris and Bologna are discussed at much length. After considering the origin of these typical foundations, in whose usages of five or six centuries ago may be found the germ of customs

and laws still recognized, even in the disjointed members of American universities, the author takes up, one by one, all the other European universities of the period he is considering. He makes four groups,—schools, improperly called universities; high schools without letters of authorization; high schools which were established by papal briefs; and high schools which received their privileges from papal and princely authority. Finally, the relation of universities to pre-existent schools is very fully discussed.

We have said enough to show that the writer is original, and to a considerable degree controversial. Whatever criticism his views may call forth,—and they are likely to be most closely scrutinized in Germany,—his diligence in the collection of facts, his comprehensive views, and his abundant references to original authorities, entitle him to the highest praise. There is good reason to think that he is right in claiming that the period he is discussing, instead of belonging to the age of darkness, is one of those epochs when the mind of man has received new impulses of unusual and persistent force.

THE WASHBURN OBSERVATORY.

THE third volume of the 'Publications of the Washburn observatory,' lately issued, gives the results of the work of 1884. About 1,800 observations were made with the Repsold meridian-circle upon the gesellschaft southern fundamental stars and the Leyden Cape of Good Hope refraction-stars. The instrumental constants are given for each observing day, and an investigation of the zenith-distance micrometer-screw and of the horizontal flexure of the instrument. In the cold winter weather of Wisconsin the micrometer-springs turned out too weak to pull the slides, and had to be replaced with stiffer ones. The probable error of a single declination is now reduced to 0".4, a great improvement over that noted in vol. ii.; and a correction of $+0".30 \pm 0".026$ to the constant of the 'Pulkowa refractions' seems to be called for by the observations of 1884 to suit the atmosphere over Madison. Professor Holden expresses his continued satisfaction with the Repsold meridian-circle, and appears to be making a very thorough study of it; and in this his example might well be followed with profit by some of our older established observatories. Two determinations of the latitude by Mr. G. C. Comstock are given,—one from Professor Holden's and his own observations with the zenith-telescope, the other from his own with the prime-vertical transit, using both reflected and direct observations; the declina-

tions in both cases being those of Auwers' system. They come out respectively—

$$+ 43^{\circ} 4' 36''.97 \pm 0''.07$$

and

$$36''.99 \pm 0''.06,$$

remarkably accordant results. The fifth part of the volume is a 'Catalogue of 1,001 southern stars for 1850.0, from observations by Signor P. Tacchini, at Palermo, in the years 1867, 1868, 1869,' by Rev. Father Hagen, S.J., and Edward S. Holden. The original observations had never been reduced to mean place; but being good ones, and in a part of the sky where needed, we have here the anomaly of European work reduced and published in this country; and Father Hagen and Professor Holden are to be highly commended for making it available, while its comparison with Oeltzen's Arge-lander (south) and the Washington zones served to detect many errors in these catalogues. The sixth part gives the observations of 437 southern stars made with the Washington transit-circle, and also the position of the same stars (whenever occurring) from the catalogues of Yarnall, Gould's zones, and Stone, all the positions being reduced to 1850.0 by Father Hagen. This is the first opportunity for easy comparison on a large scale between these four systems of southern declinations, and the comparison develops the following important differences of north polar-distance:—

Yarnall	= + 1''.12 (from 220 stars)
Gould (Z.C.)	= + 1''.96 (" 215 ")
Stone	= + 1''.00 (" 238 ")

It is a rather unexpected anomaly to find the Cordoba zone-catalogue and Stone differing by nearly a second, but that the Washington transit-circle should be so much out will not probably occasion much surprise to any one.

The volume closes with a count of the *Durchmusterung* stars between -2° and $+13^{\circ}$, a determination of the constants of some of the other instruments, meteorological observations for 1884, a summary of the same as taken at Madison continuously from 1853 to 1884, and is throughout a highly creditable publication. In his new field at the Lick observatory, Professor Holden will have the satisfaction of having left behind a valuable monument in these three volumes.

ARTIFICIAL WINDS.

A NOVEL apparatus has been constructed by M. Rougerie, a priest of Pamiers, in France, and brought recently before the French academy of sciences. It gives rise to air currents similar to the great winds of the earth's atmosphere, and hence its name, the *anémogène*. As described in *Engineering*, the apparatus consists of a small artificial terrestrial globe put into rapid rotation

in the surrounding air. In fact, it is a miniature of the earth, and by its rapid rotation it gives rise to air currents resembling the trade and other dominant winds of the world. These currents are shown by girouettes placed round the globe at small intervals, like the wind marks on the French marine charts. The apparatus reveals the following facts: The north-east and south-east trades are reproduced, and the equatorial zone of calms caused by their meeting. The gentle breezes from north and south, which disturb the equatorial calms, are also seen. So is the overthrow of the north-east trade in the south-west monsoons in the gulfs of Oman and Bengal. An ascending current in the equatorial regions is shown, and a descending current near the Azores under the centre of maximum barometrical pressure of the North Atlantic; also a descending current is indicated between St. Helena and the meridional coast of Africa, under the centre of maximum barometric pressure of the South Atlantic. At the poles there is a current descending from the zenith. The south-east trade at the Canaries is represented, while at the same time a south wind blows at the summit of the Peak of Teneriffe. Ascending currents from the east and west over Central America combine with the upper returning current of the north-east trade, thus explaining how the ashes of the volcano of Consequina, on Lake Nicaragua, were transported to Jamaica during the eruption of the 25th of February, 1835. Owing to the defects of construction, the *anémogène*, however, does not reproduce in a perfect fashion the variable winds between the tropic of Cancer and 50° N. lat., nor the corresponding winds between the tropic of Capricorn and 50° S. lat. In the same way the south-west and north-west winds of 50° N. and S. lat. are not very faithfully imitated.

EVERY student of biology knows of Huxley and Martin's 'Elementary text-book of biology.' Most teachers have either used the book, or been influenced by it in forming or modifying their laboratory courses. But the lack of illustrations, and brevity of the text, made the book to many almost useless. Mr. Howe's atlas (*Macmillan*) is intended to supplement the text-book in the first of these particulars. Its plates show the student exactly the points to which the text refers. It is a series of twenty-four large plates containing some five hundred figures. Each plate is accompanied by two or three pages of explanation, and the work closes with a few admirable practical directions and a bibliography. In anatomical accuracy the book is all that any one could reasonably desire. The figures, however, differ greatly in clearness and finish.